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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AT-F-1291P	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/JP2004/016793	International filing date (day/month/year) 05.11.2004	Priority date (day/month/year) 07.11.2003	
International Patent Classification (IPC) or national classification and IPC F02D17/02, F02D35/00			
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the International application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input checked="" type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 29.07.2005		Date of completion of this report 23.12.2005	
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Vedoato, L Telephone No. +49 89 2399-8053 	

INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITYInternational application No.
PCT/JP2004/016793**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-14 as originally filed

Claims, Numbers

1-5 received on 29.07.2005 with letter of 25.07.2005

Drawings, Sheets

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify):*
- ☐ any table(s) related to sequence listing *(specify):*

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify):*
- ☐ any table(s) related to sequence listing *(specify):*

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**International application No.
PCT/JP2004/016793

Box No. II Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
 - ☒ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-5
	No: Claims	
Inventive step (IS)	Yes: Claims	1-5
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-5
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/JP2004/016793

Reference is made to the following document:

D1: DE 33 34 720

Point V - Novelty

1.1 The subject matter of claim 1 fulfills the requirements of Art. 33(2) PCT because in none of the available documents the a device is described as having all the claimed features.

1.2 Claims 2-5 are novel by virtue of their dependency.

Point V - Inventive Step

2.1 The subject matter of claim 1 fulfills the requirements of Article 33(3) PCT. D1 is the closest prior art and discloses a control device for the operation of an engine with a reduced number of cylinders on the base of a predefined intervention curve. The claimed device differs from the nearest state of the art in that a learning process is used in order to change the intervention point of the switching procedure, thus allowing to more precisely command the engine according to the operating conditions. Such a learning device is not known, alone or in combination, from any of the available prior art documents.

2.2 Claims 2-5 are also inventive by virtue of their dependency.

Point V - Industrial applicability

3.1 Industrial applicability is given for all the claims

Claims

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1. A control device for cylinder reducing operation in which at least one of cylinders of a multi-cylinder internal combustion engine are selectively inactivated, comprising a detector detecting engine output torque and judging if the cylinder reducing operation is to be executed while referring to the engine output torque detected with the detector; wherein criteria of the judgment of the execution of the cylinder reducing operation are modified through a learning process in which, when an engine is operated in the reduced cylinder mode, an output torque at a certain engine revolution and at a predetermined upper limit of throttle angle is set to the upper limit of engine output torque at the certain engine revolution for the judgment of the execution of the reduced cylinder operation.

2. A device according to claim 1, wherein the judgment of the execution of the cylinder reducing operation based upon the engine output torque is performed by setting out a two-dimensional map of engine revolution and the engine output torque, which map is divided into a normal operation region and a reduced cylinder operation region; and judging which of the normal operation region and the reduced cylinder operation region an engine operation condition is fallen into.

3. A device according to claim 2, wherein the map is modified depending upon engine operating environments.

4. A device according to either of claims 1, wherein an output shaft of the multi-cylinder engine is operationally linked to an electric motor and an electric generator through a planetary gear and an axle of the planetary gear linked to the motor drives wheels, and the detector detecting engine output torque is the generator.

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5. A device according to claim 4, wherein a variation of the output torque from the engine due to a variation of an inertial mass of motion in the engine is compensated based upon the detection of the output torque.

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